CLAIMS

1. A crosslinked optically active three-dimensional polymer network consisting of one homochiral unit of at least one first selector and of at least one homochiral unit of at least one second selector of a structure different from the first selector,
the homochiral unit of the first selector containing one polymerizable functional group and the homochiral unit(s) of the second selector containing at least two polymerizable or crosslinkable functional groups,
the homochiral units being chemically linked to one another,
with the exclusion of the crosslinked three-dimensional polymer networks obtained by polymerization of (S)-glycidylmethacrylate and simultaneous cross-linking with (S,S)-2,3-butanediol dimethacylate or by polymerization of 3-([2-(S)-hyroxy]-N-benzylamino)propylmethacrylate and simultaneous cross-linking with (S,S)-2,3-butanediol methacrylate.

2. A crosslinked optically active three-dimensional polymer network consisting of at least one homochiral unit of at least one first selector and of at least one homochiral unit of at least one second selector of structure different from the first selector and of at least one homochiral unit of at least one third selector of structure different from the first and from the second selector, the homochiral unit(s) of the first selector containing one polymerizable functional group, the homochiral unit(s) of the third selector containing at least one polymerizable functional group and the homochiral unit(s) of the second selector containing at least two polymerizable or crosslinkable functional groups,

the homochiral units being chemically linked to one another.

3. The polymer network according to claim 1 wherein a nonchiral crosslinking agent containing at least two polymerizable or crosslinkable functional groups is attached to at least some of the homochiral units of a selector chosen from the group comprising the first selector, the second selector and, optionally, the third selector.

4. The polymer network according to claim 1, wherein the homochiral unit of the first selector and, optionally, the homochiral units of the third selector are chosen from the group comprising in particular mono-6-O-(4-allyloxyphenylcarbamate)-hexakis-6-O-(3,5-dimethylphenylcarbamate)-di-heptakis-2,3-O-(3,5-dimethylphenylcarbamate)-β-cyclodextrin, 2-propynyl-tetra-O-acetyl-β-glucopyranoside, allyl-α-D-galactopyranoside, 1-O-allyl-2-deoxy-4,6-O-isopropylidene-2-(trifluoroacetamido)- α-D-galacto pyranoside, 7-allyl-7,8-dihydro-8-oxoguanosine, (R)-(+)-α-acryloxy-β,β-dimethylbutyrolactone, acrylamido-(L)-alanine ethyl ester, (2S,5R)-(+)-5-vinyl-2-quinuclidinemethanol, (2R,5R)-()-5-vinyl-2-quinuclidinemethanol, quinine and quinidine.

5. The polymer network according to claim 1, wherein the homochiral units of the second selector and, optionally, of the third selector are chosen from the group comprising in particular (R,R)-dithiothreitol (DTT), tartaric acid or derivatives thereof, such as N,N'-diallyltartramide (DAT), di-tert-butylbenzoyldiallyltartramide (DBBDAT), diacetyldiallyltartramide (DADAT), bi-derivatives of cyclodextrin, in particular β-cyclodextrin, such as bis-6A,6D-O-(4-allyloxyphenylcarbamate)pentakis-6-O-(3,5-

dimethylphenylcarbamate)-di-heptakis-2,3-(3,5-dimethylphenylcarbamate)-β-cyclodextrin.

6. The polymer network according to claim 3, wherein the nonchiral crosslinking agent containing at least two polymerizable or crosslinkable functional groups is chosen from the group comprising in particular ethanedithiol, trithiocyanuric acid, 1,6-hexanedithiol, 1,2,6-hexanetrioltrithioglycolate and 2,5-dimercapto-1,3,4-thiadiazole.

7. The polymer network according to claim 1, in which the homochiral units of at least one of the selectors are β-cyclodextrin derivatives.

8. The polymer network according to claim 2 wherein a nonchiral crosslinking agent containing at least two polymerizable or crosslinkable functional groups is attached to at least some of the homochiral units of a selector chosen from the group comprising the first selector, the second selector and, optionally, the third selector.

9. The polymer network according to claim 2, wherein the homochiral units of the first selector and, optionally, of the third selector are chosen from the group comprising in particular mono-6-O-(4-allyloxyphenylcarbamate)-hexakis-6-O-(3,5-dimethylphenylcarbamate)-di-heptakis-2,3-O-(3,5-dimethylphenylcarbamate)-β-cyclodextrin, 2-propynyl-tetra-O-acetyl-β-glucopyranoside, allyl-α-D-galactopyranoside, 1-O-allyl-2-deoxy-4,6-O-isopropylidene-2-(trifluoroacetamido)- α-D-galacto pyranoside, 7-allyl-7,8-dihydro-8-oxoguanosine, (R)-(+)-α-acryloxy-β,β-dimethylbutyrolactone, acrylamido-(L)-alanine ethyl ester, (2S,5R)-(+)-5-vinyl-2-quinuclidinemethanol, (2R,5R)-()-5-vinyl-2-quinuclidinemethanol, quinine and quinidine.

10. The polymer network according to claim 2, wherein the homochiral units of the second selector and, optionally, of the third selector are chosen from the group comprising in particular (R,R)-dithiothreitol (DTT), tartaric acid or derivatives thereof, such as N,N'-diallyltartramide (DAT), di-tert-butylbenzoyldiallyltartramide (DBBDAT), diacetyldiallyltartramide (DADAT), bi-derivatives of cyclodextrin, in particular β-cyclodextrin, such as bis-6A,6D-O-(4-allyloxyphenylcarbamate)pentakis-6-O-(3,5-dimethylphenylcarbamate)-di-heptakis-2,3-(3,5-dimethylphenylcarbamate)-β-cyclodextrin.

11. The polymer network according to claim 8, wherein the nonchiral crosslinking agent containing at least two polymerizable or crosslinkable functional groups is chosen from the group comprising in particular ethanedithiol, trithiocyanuric acid, 1,6-hexanedithiol, 1,2,6-hexanetrioltrithioglycolate and 2,5-dimercapto-1,3,4-thiadiazole.

12. The polymer network according to claim 2, in which the homochiral units of at least one of the selectors are β-cyclodextrin derivatives.

13. A method for preparing a polymer network according to claim 1, wherein:

a) at least one first selector consisting of one homochiral unit containing one polymerizable functional group, at least one second selector consisting of at least one homochiral unit containing at least two polymerizable or crosslinkable functional groups are selected;

b) either the homochiral unit of the first selector is copolymerized with the homochiral units of the second selector and,;

c) or else at least some of the homochiral units containing at least two polymerizable or crosslinkable functional groups of the second selector are homopolymerized, and the homopolymerizates obtained are copolymerized with the homochiral unit of the first selector and optionally crosslinked with the remaining homochiral units containing at least two polymerizable or crosslinkable functional groups of the second selector.

14. A method for preparing a polymer network according to claim 3, wherein:

a) at least one first selector consisting of one homochiral unit containing one polymerizable functional group, at least one second selector consisting of at least one homochiral unit containing at least two polymerizable or crosslinkable functional groups are selected;

b) at least one nonchiral crosslinking agent containing at least two polymerizable or crosslinkable functional groups is selected;

c) at least the homochiral unit of the first selector or at least some of the second selector are reacted with the nonchiral crosslinking agent;

d) either the homochiral unit of the first selector is copolymerized with the homochiral units of the second selector and,;

e) or else at least some of the homochiral units containing at least two polymerizable or crosslinkable functional groups of the second selector are homopolymerized, and the homopolymerizates obtained are copolymerized with the homochiral unit of the first

selector and optionally crosslinked with the remaining homochiral units containing at least two polymerizable or crosslinkable functional groups of the second selector.

15. A method for preparing a polymer network according to claim 2, wherein:

a) at least one first selector consisting of at least one homochiral unit containing one polymerizable functional group, at least one second selector consisting of at least one homochiral unit containing at least two polymerizable or crosslinkable functional groups and at least one third selector consisting of at least one homochiral unit containing at least one polymerizable or crosslinkable functional group are selected;

b) either the homochiral units of the first selector are copolymerized with the homochiral units of the second selector and with the homochiral units of the third selector;

c) or else at least some of the homochiral units containing one polymerizable or crosslinkable functional group of the first selector are homopolymerized, and the homopolymerizates obtained are crosslinked with the homochiral units containing at least two polymerizable or crosslinkable functional groups of the second selector and of the third selector, optionally in the presence of the remaining homochiral units of the first selector.

16. A method for preparing a polymer network according to claim 8, wherein:

a) at least one first selector consisting of at least one homochiral unit containing one polymerizable functional group, at least one second selector consisting of at least one homochiral unit containing at least two polymerizable or crosslinkable functional groups and at least one third selector consisting of at least one homochiral unit containing at least one polymerizable or crosslinkable functional group are selected;

b) at least one nonchiral crosslinking agent containing at least two polymerizable or crosslinkable functional groups is selected;

c) at least some of the homochiral units of the first selector or of the second selector or of the third selector are reacted with the nonchiral crosslinking agent;

d) either the homochiral units of the first selector are copolymerized with the homochiral units of the second selector and with the homochiral units of the third selector;

e) or else at least some of the homochiral units containing one polymerizable or crosslinkable functional group of the first selector are homopolymerized, and the homopolymerizates obtained are crosslinked with the homochiral units containing at least two polymerizable or crosslinkable functional groups of the second selector and of the third selector, optionally in the presence of the remaining homochiral units of the first selector.

17. An optically active support material containing a polymer network according to claim 1, and an inert, mineral or organic support, said support preferably being in the form of solid particles.

18. The support material according to claim 9, consisting of at least 0.1% by weight of the polymer network.

19. The support material according to claim 9 wherein the polymer network is chemically linked to the support or is deposited onto the support.

20. An optically active support material containing a polymer network according to claim 2, and an inert, mineral or organic support, said support preferably being in the form of solid particles.

21. The support material according to claim 20, consisting of at least 0.1% by weight of the polymer network.

22. The support material according to claim 20, wherein the polymer network is chemically linked to the support or is deposited onto the support.

23. Method for the purification of a mixture of at least two constituents, chosen from the group comprising organic, mineral or organomineral molecules, wherein the various constituents are brought into contact with a polymer network according to claim 1 and at least part of one of these constituents is removed.

24. Method for removing from a mixture of at least two enantiomers, chosen from the group comprising chiral organic molecules or chiral organomineral molecules, at least part of one of these constituents, wherein the mixture is brought into contact with the polymer network according to claim 1 in order to form a polymer network/absorbed enantiomer complex, said complex is then filtered and destroyed with a solvent for said enantiomer, so as to enrich the mixture in

one of the optically active homochiral molecules and to thus obtain one of the enantiomers enriched.

25. Method for separating optically active molecules by chromatographic method, wherein the stationary phase is the polymer network according to claim 1.

26. Method for the purification of a mixture of at least two constituents, chosen from the group comprising organic, mineral or organomineral molecules, wherein the various constituents are brought into contact with a polymer network according to claim 2 and at least part of one of these constituents is removed.

27. Method for removing from a mixture of at least two enantiomers, chosen from the group comprising chiral organic molecules or chiral organomineral molecules, at least part of one of these constituents, wherein the mixture is brought into contact with the polymer network according to claim 2 in order to form a polymer network/absorbed enantiomer complex, said complex is then filtered and destroyed with a solvent for said enantiomer, so as to enrich the mixture in one of the optically active homochiral molecules and to thus obtain one of the enantiomers enriched.

28. Method for separating optically active molecules by chromatographic method, wherein the stationary phase is the polymer network according to claim 2.

29. Method of asymmetric synthesis wherein the synthesis is performed with a polymer network according to claim 1, optionally in the presence of a transition metal.

30. Method of asymmetric synthesis wherein the synthesis is performed with a polymer network according to claim 2, optionally in the presence of a transition metal.